

**IN THE CLAIMS**

Please cancel claims 9, 11, 12, 21, 23, 24, 33, 35-38, 40-42, 52-54, 58, and 65-69, and amend claims 1-5, 7, 10, 13-20, 22, 25-32, 34, 39, 43-49, 55-57, and 59-64 as follows:

1. (Currently Amended) A three dimensional modeling apparatus for generating three dimensional shape data of a three dimensional object, comprising:

projection means for projecting coded pattern light onto said three dimensional object;

image input means for inputting [[an image]] images of said three dimensional object including a first image capturing device and a second image capturing device;

rough shape calculation means for calculating a rough shape of said three dimensional object;

detailed shape calculation means for calculating a detailed shape from said [[image]] images; and

three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three

dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

2. (Currently Amended) A three dimensional modeling apparatus for generating three dimensional shape data of a three dimensional object, comprising:  
projection means for projecting coded pattern light onto said three dimensional object;

image input means for inputting [[an image]] images of said three dimensional object including a first image capturing device and a second image capturing device;

rough shape input means for inputting a rough shape of said three dimensional object;

detailed shape calculation means for calculating a detailed shape from said [[image]] images; and

three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

3. (Currently Amended) A three dimensional modeling apparatus for generating three dimensional shape data of a three dimensional object, comprising:

image input means for inputting [[an image]] images of said three dimensional object including a first image capturing device and a second image capturing device, said [[image]] images being obtained by projecting coded pattern light onto said three dimensional object;

rough shape calculation means for calculating a rough shape from said [[image]] images;

detailed shape calculation means for calculating a detailed shape from said [[image]] images; and

three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

4. (Currently Amended) A three dimensional modeling apparatus for generating three dimensional shape data of a three dimensional object, comprising:

image input means for inputting [[an image]] images of said three dimensional object including a first image capturing device and a second image capturing device, said [[image]] images being obtained by projecting coded pattern light onto said three dimensional object;

rough shape input means for inputting a rough shape of said three dimensional object;

detailed shape calculation means for calculating a detailed shape from said [[image]] images; and

three dimensional shape data generating means for generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

5. (Currently Amended) A three dimensional modeling apparatus according to claim 1,

wherein said three dimensional shape data generating means determines the final three dimensional shape data based on the following rule; if the detailed shape [[exists]] exists inside the rough shape, then the detailed shape is the final three

dimensional shape data of said object, otherwise the rough shape is taken as the final three dimensional shape data of said object.

6. (Original) A three dimensional modeling apparatus according to claim 1, wherein said three dimensional shape data generating means obtains a region where the object surface can exist based on the rough shape, to generate three dimensional shape data of said three dimensional object based on the rough shape, the detailed shape, and the region where the object surface can exist.

7. (Currently Amended) A three dimensional modeling apparatus according to claim 1, wherein said detailed shape calculation means obtains a plurality of object surface location candidates from the ~~input image~~ images.

8. (Original) A three dimensional modeling apparatus according to claim 1, wherein said detailed shape calculation means sets a region where the object surface cannot exist in a portion inside the rough shape and determines a region inside the rough shape other than said region where the object surface cannot exist as a region where the object surface can exist, to generate three dimensional shape data of said three dimensional object based on the rough shape, the detailed shape, and the region where the object surface can exist.

9. (Cancelled).

10. (Currently Amended) A three dimensional modeling apparatus according to claim 1, wherein the rough shape is calculated by said rough shape calculation means based on silhouette information obtained from the ~~object image~~ images input by said image input means.

11. (Cancelled).

12. (Cancelled).

13. (Currently Amended) A three dimensional modeling method for generating three dimensional shape data of a three dimensional object, comprising ~~the steps of~~:  
projecting coded pattern light onto said three dimensional object;  
inputting ~~[[an image]]~~ images of said three dimensional object using a first image capturing device and a second image capturing device;  
calculating a rough shape from said ~~[[image]]~~ images;  
calculating a detailed shape from said ~~[[image]]~~ images; and  
generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

14. (Currently Amended) A three dimensional modeling method for generating three dimensional shape data of a three dimensional object, comprising ~~the steps of~~:  
projecting coded pattern light onto said three dimensional object;  
inputting ~~[[an image]]~~ images of said three dimensional object using a first image capturing device and a second image capturing device;  
capturing a rough shape of said three dimensional object;

calculating a detailed shape from said [[image]] images; and  
generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

15. (Currently Amended) A three dimensional modeling method for generating three dimensional shape data of a three dimensional object, comprising ~~the steps of:~~

inputting [[an image]] images of said three dimensional object using a first image capturing device and a second image capturing device, said [[image]] images being obtained by projecting pattern light onto said three dimensional object;

calculating a rough shape from said [[image]] images;

calculating a detailed shape from said [[image]] images; and

generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image

captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

16. (Currently Amended) A three dimensional modeling method for generating three dimensional shape data of a three dimensional object, comprising ~~the steps of:~~

inputting [[an image]] images of said three dimensional object using a first image capturing device and a second image capturing device, said [[image]] images being obtained by projecting pattern light onto said three dimensional object;

capturing a rough shape of said three dimensional object;

calculating a detailed shape from said [[image]] images; and

generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

17. (Currently Amended) A three dimensional modeling method according to claim 13,



wherein ~~said step of~~ generating three dimensional shape data includes determining the final three dimensional shape data based on the following rule; if the detailed shape ~~[[exits]]~~ exists inside the rough shape, then the detailed shape is the final three dimensional shape data of said object, otherwise the rough shape is taken as the final three dimensional shape data of said object.

18. (Currently Amended) A three dimensional modeling method according to claim 13,

wherein ~~said step of~~ generating three dimensional shape data includes obtaining a region where the object surface can exist based on the rough shape, to generate three dimensional shape data of said three dimensional object based on the rough shape, the detailed shape, and the region where the object surface can exist.

19. (Currently Amended) A three dimensional modeling method according to claim 13,

wherein ~~said step of~~ calculating detailed shape includes obtaining a plurality of object surface location candidates from the ~~input image~~ images.

20. (Currently Amended) A three dimensional modeling method according to claim 13,

wherein ~~said step of~~ calculating detailed shape includes setting a region where the object surface cannot exist in a portion inside the rough shape and determining a region inside the rough shape other than said region where the object surface cannot exist as a region where the object surface can exist, to generate three dimensional shape data of said three dimensional object based on the rough shape, the detailed shape, and the region where the object surface can exist.

21. (Cancelled).

22. (Currently Amended) A three dimensional modeling method according to claim 13,

wherein the rough shape is calculated by said rough shape calculation means based on silhouette information obtained from the ~~object image~~ images input by said step of inputting an image.

23. (Cancelled).

24. (Cancelled).

25. (Currently Amended) A medium having a program recorded therein for causing a computer to generate three dimensional shape data of a three dimensional object, said program comprising ~~the steps of~~:

controlling pattern light projection section connected to said computer for projecting coded pattern light onto said three dimensional object;

inputting ~~[[an image]]~~ images of said three dimensional object using a first image capturing device and a second image capturing device;

calculating a rough shape from said ~~[[image]]~~ images;

calculating a detailed shape from said ~~[[image]]~~ images; and

generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means

generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

26. (Currently Amended) A medium having a program recorded therein for causing a computer to generate three dimensional shape data of a three dimensional object, said program comprising ~~the steps of:~~

controlling a pattern light projection section connected to said computer for projecting coded pattern light onto said three dimensional object;

inputting ~~[[an image]]~~ images of said three dimensional object using a first image capturing device and a second image capturing device;

capturing a rough shape of said three dimensional object;

calculating a detailed shape from said ~~[[image]]~~ images; and

generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

27. (Currently Amended) A medium having a program recorded therein for causing a computer to generate three dimensional shape data of a three dimensional object, said program comprising ~~the steps of:~~

inputting [[an image]] images of said three dimensional object using a first image capturing device and a second image capturing device, which [[is]] are obtained by projecting coded pattern light onto said three dimensional object;

calculating a rough shape from said [[image]] images;

calculating a detailed shape from said [[image]] images; and

generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

28. (Currently Amended) A medium having a program recorded therein for causing a computer to generate three dimensional shape data of a three dimensional object, said program comprising ~~the steps of~~:

inputting [[an image]] images of said three dimensional object using a first image capturing device and a second image capturing device, which [[is]] are obtained by projecting coded pattern light onto said three dimensional object;

capturing a rough shape of said three dimensional object;

calculating a detailed shape from said [[image]] images; and

generating three dimensional shape data of said three dimensional object based on said rough shape and said detailed shape, wherein said three dimensional shape data generating means determines said detailed shape using at least one final object surface location candidate selected from a plurality of object surface location candidates based on matching a coded light pattern region of a first image captured by the first image capturing device to a predetermined coded light pattern region of a second image captured by the second image capturing device and determining that the at least one final object surface location candidate is located in a predetermined region where the object surface can exist, said three dimensional shape data generating means generating three dimensional shape data of said three dimensional object based on said at least one final object surface location candidate.

29. (Currently Amended) A medium having a three dimensional modeling program recorded therein according to claim 25,

wherein ~~said step of~~ generating three dimensional shape data includes determining the final three dimensional shape data based on the following rule; if the detailed shape exists inside the rough shape, then the detailed shape is the final three dimensional shape data of said object, otherwise the rough shape is taken as the final three dimensional shape data of said object.

30. (Currently Amended) A medium having a three dimensional modeling program recorded therein according to claim 25,

wherein ~~said step of~~ generating three dimensional shape data includes obtaining a region where the object surface can exist based on the rough shape, to generate three dimensional shape data of said three dimensional object based on the rough shape, the detailed shape, and the region where the object surface can exist.

31. (Currently Amended) A medium having a three dimensional modeling program recorded therein according to claim 25,

wherein ~~said step of~~ calculating a detailed shape includes obtaining a plurality of object surface location candidates from the ~~input image~~ images.

32. (Currently Amended) A medium having a three dimensional modeling program recorded therein according to claim 25,

wherein ~~said step of~~ calculating a detailed shape includes setting a region where the object surface cannot exist in a portion inside the rough shape and determining a region inside the rough shape other than said region where the object surface cannot exist as a region where the object surface can exist, to generate three dimensional shape data of said three dimensional object based on the rough shape, the detailed shape, and the region where the object surface can exist.

33. (Cancelled)

34. (Currently Amended) A medium having a three dimensional modeling program recorded therein according to claim 25,

wherein the rough shape is calculated by ~~said step of~~ calculating a rough shape based on silhouette information obtained from the object image input by ~~said step of~~ inputting an image.

35-38 (Cancelled).

39. (Currently Amended) A three dimensional modeling apparatus according to claim 1,

wherein said detailed shape calculation means extracts a pattern projected region and a pattern border region in said ~~input image~~ images to calculate the detailed shape of said three dimensional object based on these regions.

40-42 (Cancelled)

43. (Currently Amended) A three dimensional modeling apparatus according to claim 1,

wherein said image input means performs image input from at least two points at different locations,

said detailed shape calculation means extracts a portion in said ~~input image~~ images where color or density changes, and

matching of portions where color or density changes is performed between ~~input~~ images, to calculate the three dimensional shape of said three dimensional object.

44. (Currently Amended) A three dimensional modeling apparatus according to claim 3,

wherein said image input means performs image input where the images are captured at least two different points at different locations,

said detailed shape calculation means extracts a portion in said ~~input image~~ images where color or density changes, and

matching of portions where color or density changes is performed between ~~input~~ images, to calculate the three dimensional shape of said three dimensional object.

45. (Currently Amended) A three dimensional modeling apparatus according to ~~claim 42~~ claim 1,

wherein said pattern light for projection includes multi-color patterns in which adjacent patterns have different colors having a hue difference of at least 90 degree or more, or a brightness difference of 0.3 or more, when the colors are represented in an HSV space.

46. (Currently Amended) A three dimensional modeling apparatus according to ~~claim 42~~ claim 1,

wherein said matching of the portions where color or density changes is obtained based on properties of the portions where color or density changes, which are obtained from the ~~input~~ images.

47. (Currently Amended) A three dimensional modeling apparatus according to claim 46,

wherein the property of the portion where color or density changes is color information regarding portions located to the left and right of, or above and below, said portion where color or density changes in said ~~input image~~ images.

48. (Currently Amended) A three dimensional modeling apparatus according to claim 46,

wherein averaging is performed on the ~~input~~ images when said property is obtained.

49. (Currently Amended) A three dimensional modeling apparatus according to claim 48,

wherein said averaging is performed for each of divided regions where color density changes of the ~~input image~~ images.

50. (Original) A three dimensional modeling apparatus according to claim 1, further comprising moving means for moving said projection means and said image input means.

51. (Original) A three dimensional modeling apparatus according to claim 50, wherein said moving means moves said projection means and said image input means based on said rough shape.

52-54 (Cancelled)

55. (Currently Amended) A three dimensional modeling method according to claim 13,



wherein ~~said step of~~ calculating the detailed shape includes extracting a pattern projected region and a pattern border region in said ~~input image~~ images to calculate the detailed shape of said three dimensional object based on these regions.

56. (Currently Amended) A three dimensional modeling method according to ~~claim 54~~ claim 55,

wherein said pattern light has a plurality of binary patterns.

57. (Currently Amended) A three dimensional modeling method according to ~~claim 54~~ claim 55,

wherein ~~said step of~~ inputting an image includes performing image input from at least two positions.

58. (Cancelled)

59. (Currently Amended) A three dimensional modeling method according to claim 13,

wherein ~~said step of~~ inputting an image includes performing image input where the images are captured at at least two points at different locations,

said ~~step of~~ calculating a detailed shape includes extracting a portion in said ~~input image~~ images where color or density change, and

matching portions where color or density changes between ~~input~~ images, to calculate the three dimensional shape of said three dimensional object.

60. (Currently Amended) A three dimensional modeling method according to ~~claim 58~~ claim 59,

wherein said pattern light for projection includes multi-color patterns in which adjacent patterns have different colors having a hue difference of at least 90 degrees or more, or a brightness difference of 0.3 or more, when the colors are represented in an HSV space.

61. (Currently Amended) A three dimensional modeling method  
according to ~~claim 58~~ claim 13,

wherein said matching of the portions where color or density changes is obtained  
based on properties of the portions where color or density changes, which are obtained  
from the ~~input image~~ images.

62. (Currently Amended) A three dimensional modeling method  
according to claim 61,

wherein the property of the portion where color or density changes is color  
information regarding portions located to the left and right of, or above and below, said  
portion where color or density changes in said ~~input~~ images.

63. (Currently Amended) A three dimensional modeling method  
according to claim 61,

wherein averaging is performed on the ~~input~~ images when said property is  
obtained.

64. (Currently Amended) A three dimensional modeling method  
according to claim 63,

wherein said averaging is performed for each of divided regions where color  
density changes of the ~~input~~ images.

65-69 (Cancelled)